LigoPTP 5-N/5-23 UNITY

5 GHz high-end backhaul device

Product Overview

LigoWave unleashes its highest-end, license-free PTP device with the release of the LigoPTP UNITY series product line. Making use of ground breaking 2x2 MiMo technology, the LigoPTP 5-23/5-N UNITY delivers real aggregate throughput capability of up to 220 Mbps (110 Mbps full-duplex) combined with high packets-per-second performance (140000) and at the same time a link bonding option integrated on the device to double the capacity for up to 400 Mbps (200 Mbps Full-duplex). Link bonding is done using a powerfull CPU and uses fair queuing mechanism. The throughput is not only doubled, but it also ensures radio link redundancy at the same time and works efficiently when traffic source is coming from a single MAC address.

Additionally, the new product is compatible with previous LigoPTP 5-23 MiMo, LigoPTP 5-N MiMo, LigoPTP 5-23 PRO and LigoPTP 5-N PRO models that can be used concurrently to double the throughput over the same link. This product enables carrier-class point-to-point capability, ideal for dedicated access or backhaul applications (including VOIP or other small packet applications). The Ligo PTP UNITY product family couples flexible channel width capability (20 or 40 MHz) and industry-leading proprietary software mechanisms to set the utmost standard in spectral efficiency.

The LigoPTP 5-23/5-N UNITY products feature either an integrated dual-polarized antenna or two N-type connectors. They are housed in rugged, cast aluminum enclosures. Combining digital signal processing, dual polarization antennas and proprietary W-Jet 2 MiMo protocol these bridges have a high spectral efficiency of 7.5bit/Hz.

The LigoPTP 5-23/5-N UNITY showcase an array of ad-vanced software mechanisms that provide optimal point-to-point connectivity for high-throughput, long distance links. LigoWave's proprietary PTP mechanisms utilize techniques such as Dynamic Time Division Duplexing (TDD) to dynamically allocate bandwidth in the direction needed, thus increasing link efficiency and greatly decreasing the impact that distance has on throughput of the link.

The LigoWave point-to-point products also features selective repeat ARQ technology, an enhanced error-correction software mechanism that optimizes data traffic to provide very high throughput over high-bandwidth, long-range links even in the presence of interference.

Additionally, the new devices support L2 and L3 QoS (quality of service which allows prioritizing of mission critical data going on a wireless link.

The new UNITY series products have an extremely powerful integrated 28 dBm (+/-2 dBm) radio which allows building solid long-distance links even with an integrated antenna. The output power on highest modulation (MCS 15) is 23 dBm (+/- 2 dBm) which is hard to find elsewhere in the market today.

Gigabit Ethernet port and 802.3 af standard support makes the UNITY series product line even more flexible. Superior SURGE and ESD protection makes this product ideal for mission critical and harsh-weather condition installations. SURGE and ESD protection meets IEC 61000-4-2 (ESD) and IEC 61000-4-5 (SURGE) standards.

The LigoPTP 5-23/5-N UNITY is also compatible with LigoWave's online link calculator and WNMS, a centralized configuration, firmware, and statistics server offered by LigoWave for remote diagnostic and configuration.
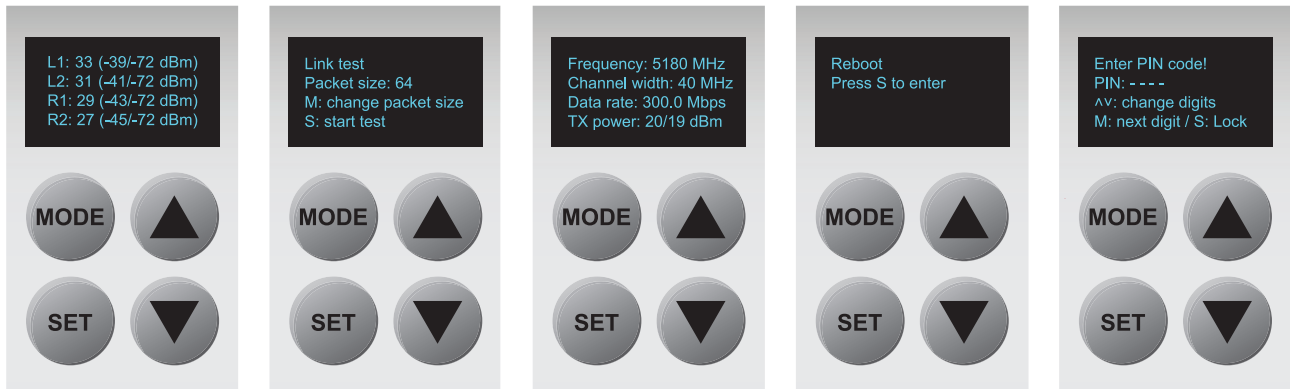
Key Features

- 5 GHz PTP bridge, ideal for:
  Dedicated Access
  Backhaul
  Private networks
- Flexible center channel and channel width capability (20/40 MHz) for throughput optimization
- Radio rate of up to 300Mbps
- True aggregate throughput up to 220 Mbps
- Advanced proprietary W-jet MiMo 2 wireless protocol
- High packet-per-second (PPS) rate – ideal for VOIP backhaul applications (140000)
- Low packet latency (2ms)
- Great spectral efficiency (7.5 bit/ Hz)
- ARQ (Selective Repeat) for very high throughput
- Dynamic TDD for allocating bandwidth in real-time to the direction needed
- Integrated dual-polarized antenna (2 N-type conectors for the LigoPTP 5-N UNITY product)
- 2nd Ethernet port used to bond two links together

- L2 and L3 QoS support
- PoE built-in for single cable installation (802.3 af compatible)
- 2 x 1000 BaseT Ethernet ports
- 28 dBm (per chain) integrated radio
- Advanced security technologies
- Comprehensive management features
  Web GUI
  Command line management via SSH
  WNMS server support for configuration
  SNMP V1/2/3 with traps supporting MIBs:802.11, 802.1x, MIBII
  Syslog support
  Compatible with LigoWave link calculator
  Real-time alerts
- Rugged articulating bracket solution for multi-facet mounting
- OLED screen for antenna alignment
- IP-67 compliant

W-jet

W-Jet is Ligowave's proprietary wireless protocol that combines special techniques to achieve superior performance and reliability even over long distances. The W-Jet protocol is the result of years of development and gives Ligowave PTP products the ability to out-perform higher cost products on the market while simultaneously increasing the return on investment.

OLED screen overview

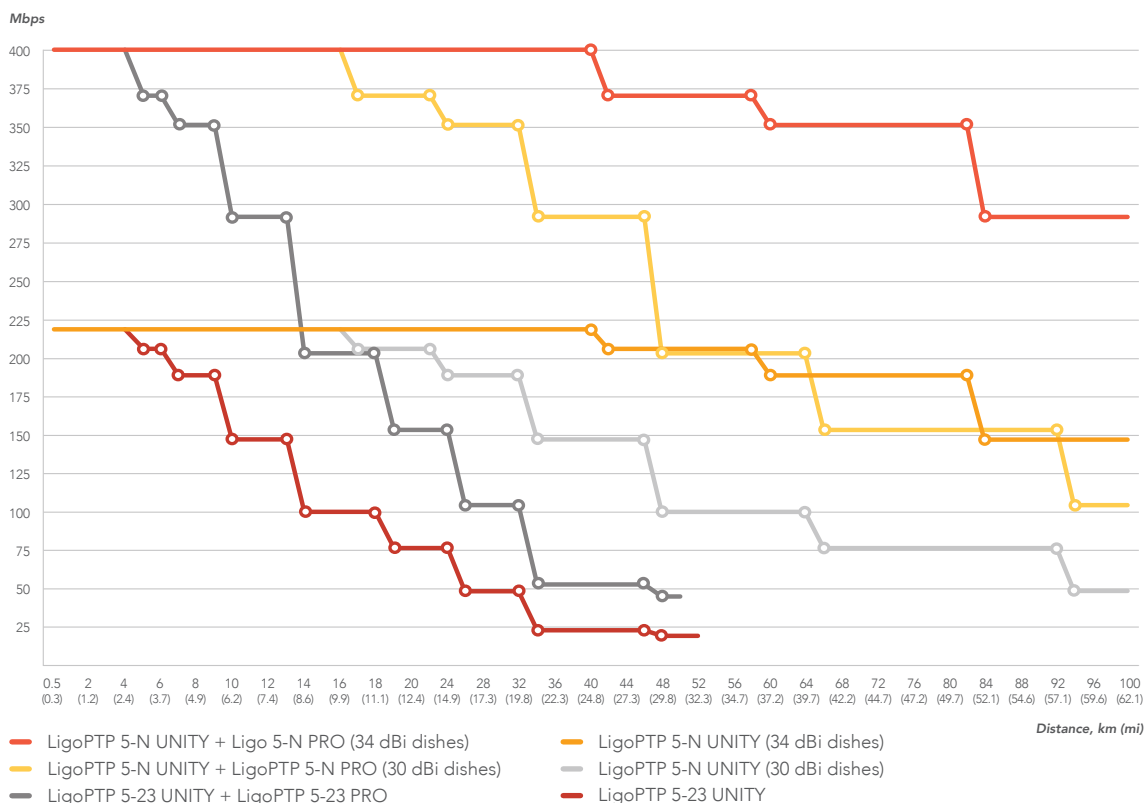|				
L1: 33 (-39/-72 dBm) L2: 31 (-41/-72 dBm) R1: 29 (-43/-72 dBm) R2: 27 (-45/-72 dBm)	Link test Packet size: 64 M: change packet size S: start test	Frequency: 5180 MHz Channel width: 40 MHz Data rate: 300.0 Mbps TX power: 20/19 dBm	Reboot Press S to enter	Enter PIN code! PIN: - - - - ^v: change digits M: next digit / S: Lock
MODE ▲ SET ▼	MODE ▲ SET ▼	MODE ▲ SET ▼	MODE ▲ SET ▼	MODE ▲ SET ▼
During the antenna alignment procedure current RSSI level of the local and remote unit can be seen	After the link deloyment it can be initailly tested with a different packet sizes for additional performance optimization	Various statistical information reviewing: - Wireless settings - TX/RX information - Ethernet statistics - Device information - IP settings	External OLED screen allows easy rebooting and resetting the unit to defauls	PIN code functionality is available for additional security of the LigoPTP units

LigoPTP UNITY distance and throughput graphs

- LigoPTP 5-N UNITY + Ligo 5-N PRO (34 dBi dishes)
- LigoPTP 5-N UNITY + LigoPTP 5-N PRO (30 dBi dishes)
- LigoPTP 5-23 UNITY + LigoPTP 5-23 PRO
- LigoPTP 5-N UNITY (34 dBi dishes)
- LigoPTP 5-N UNITY (30 dBi dishes)
- LigoPTP 5-23 UNITY

The graph above represents LigoPTP 5-23 UNITY, LigoPTP 5-N UNITY, LigoPTP 5-23 PRO and LigoPTP 5-N PRO capacity at different distances. The calculations were done with a 15 dB fade margin and no interference on the link.

LigoOS overview

Software running on the LigoPTP devices is extremely easy to use and designed with a point-to-point application in mind. The main functionality of the OS is outlined below:

Wireless Modes

Master

Slave

Wireless Network Configuration

W-Jet 2/3 transparent point-to-point

SiSo/ MiMo radio modes

Selectable channel width: 20/ 40 MHz

Channel selection: automatic/ manual

Data rate control: automatic/ manual

Transmit power control: automatic/ manual

SSID broadcast disabling

Wireless security: AES 128-bit encryption

Adjustable aggregation frames

Dynamic Frequency selection

Device Configuration and Services

Administrator access

Location: latitude and longitude

OLED control

HTTP/ HTTPS/ SSH/ SFTP access

System alerts

NTP client

SNMP v1 support

Local system log

Statistical performance reporting on graphs   NET

Network Modes

Switch

Link Aggregation

Link Failover

2nd Link Configuration

Network Configuration

Port speed control

Separate VLAN for management

Dot1q VLAN, Q-in-Q, ISL, MPLS, VPLS pass-through

Static and dynamic management IP

Wire speed QoS: L2 CoS and L3 DSCP

Supported frame size: 3688 bytes
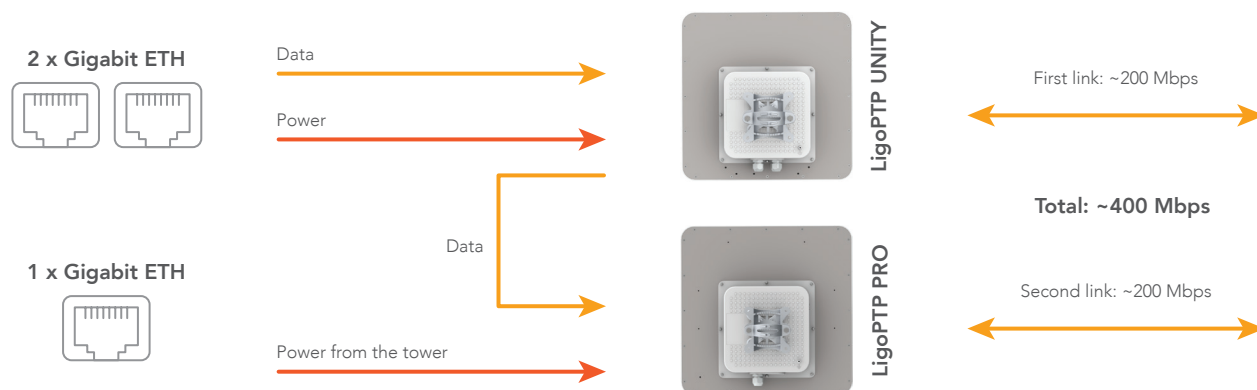
Management and Maintenance

WEB GUI

Command line interface

WNMS agent

Reset to defaults

Special troubleshooting file

Configuration management: backup/ restore

Dual boot firmware image

Firmware recovery via TFTP

Tools

Spectrum analyzer

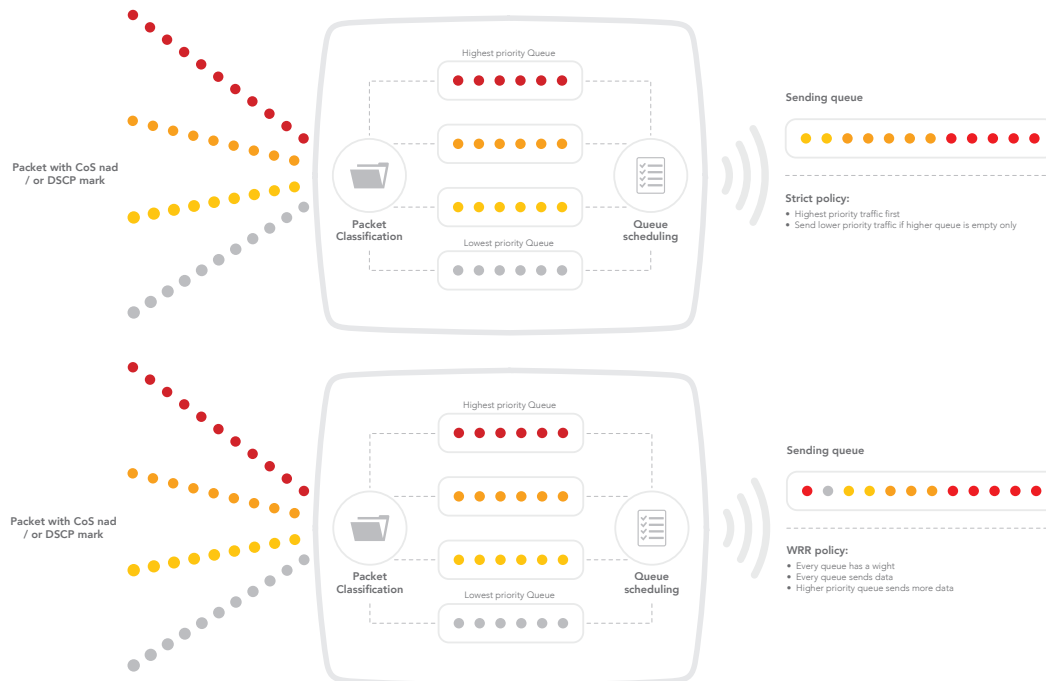Site survey

Link test

Antenna alignment

Delayed reboot

LigoPTP UNITY bonding

Link bonding is a new functionality available in LigoPTP UNITY devices. An extremely powerful CPU allows bonding LigoPTP UNITY together with LigoPTP MiMO or LigoPTP PRO series devices. The 2nd Ethernet port is where the additional device is connected. Fair queuing mechanism is used for bonding of two links operating simultaneously. Besides doubling the throughput over the same link (from 200 Mbps to 400 Mbps) it also provides redundancy for the wireless radios; if one of the radios fails the other link will continue to operate. As the bonding is done in the CPU it works efficiently even when the traffic is coming from one MAC address (for example router). The scheme of the bonded LigoPTP UNITY and LigoPTP PRO link can be seen below.

2 x Gigabit ETH

Data

Power

LigoPTP UNITY

First link: ~200 Mbps

Total: ~400 Mbps

1 x Gigabit ETH

Data

Power from the tower

LigoPTP PRO

Second link: ~200 Mbps

LigoPTP UNITY QoS

LigoPTP UNITY devices support L2 (802.1p) and L3 (DSCP) QoS. In layer 2 QoS data is prioritized according to VLANs while in layer 3 according to IP addresses. Both types of QoS can run together or independently and traffic can be mapped into 4 different queues for each type applying strict or WRR policies. Having QoS on your link aloows you to prioritize mission critical data and real time data that requires more capacity and higher PPS rate. Max capacity for each of the queues is calculated according to the wireless link, dynamically.

Packet with CoS nad / or DSCP mark

Highest priority Queue

Lowest priority Queue

Packet Classification

Queue scheduling

Sending queue

Strict policy:
- Highest priority traffic first
- Send lower priority traffic if higher queue is empty only

Packet with CoS nad / or DSCP mark

Highest priority Queue

Lowest priority Queue

Packet Classification

Queue scheduling

Sending queue

WRR policy:
- Every queue has a wight
- Every queue sends data
- Higher priority queue sends more data

Wireless Network Management System

WNMS is a FREE enterprise grade Wireless Network Management system available for download at LigoWave's website. A single software solution simplifies a large number of management and monitoring tasks for network the administrator. Comprehensive network management software supports several thousand devices. Main WNMS tasks:

- Supporting LigoWave, Deliberant and 3rd party equipment*
- Multiple OS support (Windows, Virtual Machine, Linux)
- Network visualization on Google Maps
- Configuration and maintenance
- Monitoring and alerting
- Smart discovery and provisioning
- Statistical data collection and reporting

WNMS

* For the control and monitoring of 3rd party equipment the SWEAP application is necessary

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WNMS Cloud is a new mobile way to manage your network. The setup is as easy as 1-2-3 and you get your virtual WNMS server running online. With the current WNMS version LigoWave, Deliberant and 3rd party devices can be monitored and controlled remotely. (3rd party device monitoring and alerting requires additional hardware, working as a data collector).

Highlights:

- Easy and quick WNMS server setup
- World-wide availability
- High reliability (based on Amazon cloud)
- Strong security (HTTPS and OpenVPN)
- No hardware and maintenance costs – reduces CAPEX and OPEX
- Third party equipment monitoring through WNMS remote agent (SWEAP application)*

WNMS CLOUD

*Need additional hardware to run SWEAP application

LinkCalc™

Link calculator is a link planning tool available online. The link calculator allows users to calculate link perfor-mance expectations taking into account geographical information, distance between the units, antenna height and gain, transmit power, and other factors in order to choose the most suitable product avail¬able from the LigoWave and Deliberant extensive product portfolios. In addition, custom calculations using other vendors' equipment specs can be used, making link calculator the ultimate link planning tool.

Available at: http://www.ligowave.com/linkcalc

Maps integration

Downloadable
PDF reports
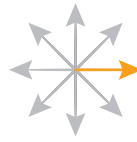
PTP and PTMP
mode support

Online storage for
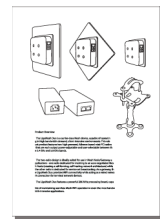saved calculations

Package contents

48 V 802.3 af PoE with
grounding and
lightning protection

LigoPTP 5-N/5-23 UNITY
outdoor unit

Professional
mounting kit

Quick install
guide

Antenna patterns

(only for LigoPTP 5-23 UNITY product)
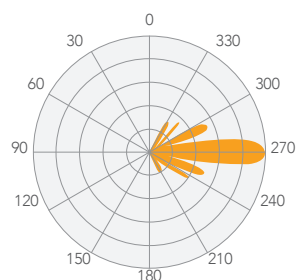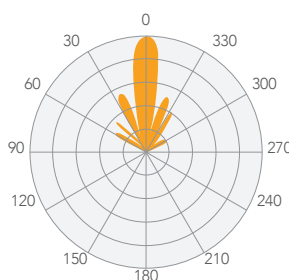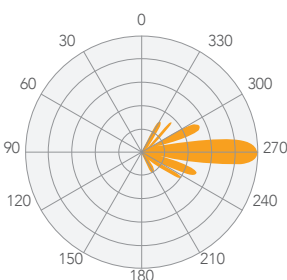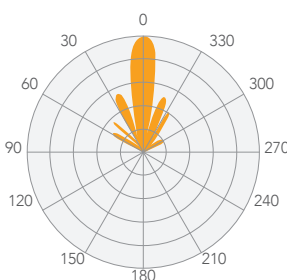
RF patterns (vertical)

Vertical cut

Horizontal cut

RF pattern (horizontal)

Vertical cut

Horizontal cut

Radio specifications

Wireless technology	Proprietary W-Jet protocol, 2x2 MIMO
Operating mode	Point-to-point
Radio frequency band	5.150 - 5.915 GHz (country dependent - FCC 5.745 to 5.825 GHz)
Channel size	Configurable 20, 40 MHz
Max transmit power	28 (+/- 2) dBm*
Modulation schemes	BPSK, QPSK, 16QAM, 64QAM
Receive sensitivity	Varying between -94 and -72 dBm depending on modulation and channel size
Error correction	FEC, Selective ARQ
Duplexing scheme	Dynamic time division duplex

Antenna

Type	Integrated directional panel (LigoPTP 5-23 UNITY) or 2 N-Type connectors (LigoPTP 5-N UNITY)
Polarization	Dual (LigoPTP 5-23 UNITY)
Gain V/H	23/23 dBi (LigoPTP 5-23 UNITY)
3dB Beam-width V/H	8/8 degrees (LigoPTP 5-23 UNITY)

Data Interface

Physical interface	2 x 10/100/1000 BaseT
Protocol	Ethernet IEEE 802.3
Connector type	RJ45
Surge protection	Built-in (IEC 61000-4-2 (ESD) and IEC 61000-4-5 (SURGE))

Link performance

Single link throughput	220 Mbps aggregate (110 Mbps full-duplex)
Bonded link throughput	400 Mbps aggregate (200 Mbps full-duplex)
Max packets per second	140,000
Packet latency	2 ms (64 bytes packet)
Recommended link distance**	More than 100 km (62,17 mi)

Security

Data encryption	Hardware based AES

Physical

Dimensions (PTP 5-N UNITY)	Width 218 mm (8.5 "), height 218 mm (8.5 "), depth 70 mm (2.7 ")
Dimensions (PTP 5-23 UNITY)	Width 335 mm (13 "), height 335 mm (13 "), depth 90 mm (3.5 ")
Weight (PTP 5-N UNITY)	2.1 kg (4.6 lb) (mount included)
Weight (PTP 5-23 UNITY)	3.4 kg (7.5 lb) (mount included)
Power supply	48 VDC, active PoE (802.3af)
Power source	100 – 240 VAC via included adapter
Power consumption	12 W

Environmental

Operating temperature	-40°C (-40 F) ~ +65°C (+150 F)
Humidity	0 ~ 90 % (non-condensing)

Management

Installation assistant	OLED screen
System configuration interfaces	User-friendly web GUI, SSH CLI, SNMP v1 with traps, centralized Remote
Management system	WNMS, WNMS Cloud

Regulatory

Certification	FCC/IC/CE
Ingress protection	IP-67
RoHs	Compliant

Country dependent
** Link distance recommendation with an external antenna